



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/921,464 | 08/03/2001 | Bradford A. Ritter | 10015867-1 | 7032 |

7590 09/29/2003

HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P.O. Box 272400
Fort Collins, CO 80527-2400

EXAMINER

YANG, RYAN R

ART UNIT PAPER NUMBER

2672

DATE MAILED: 09/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/921,464

Applicant(s)

RITTER, BRADFORD A.

Examiner

Ryan R Yang

Art Unit

2672

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 September 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-31 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5. 6) ☐ Other: _____

DETAILED ACTION

1. This action is responsive to communications: Amendment, filed on 9/21/2001. This action is non-final.
2. Claims 1-31 are pending in this application. Claims 1, 17 and 27 are independent claims. In the Amendment, filed on 9/21/2001, claims 7-10 and 31 were amended.
3. The present title of the invention is "System and method for performing texture synthesis" as filed originally.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

5. Claims 1-10, 14, 17-20, 23, 25 and 27-31 are rejected under 35 U.S.C. 102(a) as being anticipated by Wei et al. (SIGGRAPH 2000 Conference Proceedings pg. 479-488).

Art Unit: 2672

6. As per claim 1, Wei et al, hereinafter Wei, discloses a method for synthesizing a texture of a desired size from a sample texture, said method comprising the steps of

generating a matrix of said desired size (G_s where G_s is a Gaussian matrix, page 483 Section 2.6; G_s is built from I_s which are a plurality of texture samples with a size, page 481 Section 2);

providing values to said matrix, wherein said values comprise random values (G_s is a Gaussian matrix, therefore the elements are random values) and wherein at least a portion of said values represents a desired structure according to which graphical features of a synthesized texture are to substantially conform (I_s which are a plurality of texture samples with a size, page 481 Section 2); and

executing a texture synthesis process that utilizes said matrix to generate a synthesized texture of said desired size having graphical features arranged therein substantially in conformance with said desired structure (**function** I_s is a texture synthesis process, where G_s is the desired size, page 483 section 2.6).

7. As per claim 2, Wei demonstrated all the elements as applied to the rejection of independent claim 1, supra, and further discloses providing step comprises:

providing constant values to said matrix that represent said desired structure ($G_s \leftarrow \text{BuildPyramid}(I_s)$ where I_s are a plurality of constants).

8. As per claim 3, Wei demonstrated all the elements as applied to the rejection of independent claim 1, supra, and further discloses providing step comprises:

Art Unit: 2672

providing constant values to said matrix that are arranged therein to represent said desired structure ($G_s \leftarrow \text{BuildPyramid}(I/s)$ where I/s are a plurality of constants).

9. As per claim 4, Wei demonstrated all the elements as applied to the rejection of independent claim 1, supra, and further discloses providing step comprises:

populating said matrix with values from a pre-existing file (I/a is the pre-existing texture sample from a file).

10. As per claim 5, Wei demonstrated all the elements as applied to the rejection of dependent claim 4, supra, and further discloses the step of:

randomizing said values from said pre-existing file ($G_s \leftarrow \text{BuildPyramid}(I/s)$ is a randomizing process).

11. As per claim 6, Wei demonstrated all the elements as applied to the rejection of dependent claim 5, supra, and further discloses randomizing step further comprises:

randomizing said values from said pre-existing file to a user-specified degree ($G_s(L)$ by setting L the resolution level, the degree of randomization can be set).

12. As per claim 7, Wei demonstrated all the elements as applied to the rejection of dependent claim 4, supra, and further discloses values from said preexisting file are nearly the desired result but are not tileable (since the input textual data is not yet randomized, it is not tileable).

Art Unit: 2672

13. As per claim 8, Wei demonstrated all the elements as applied to the rejection of dependent claim 4, supra, and further discloses values from said pre-existing file include said at least a portion of values that represent said desired structure, but wherein said matrix having values from said pre-existing file is not readily tileable (since the input textual data is not yet randomized, it is not tileable).

14. As per claim 9, Wei demonstrated all the elements as applied to the rejection of independent claim 1, supra, and further discloses executing said texture synthesis process further comprises the steps of:

- (a) selecting a value from said matrix (selecting (X_s , Y_s), page 483, **function** *Is*, line 5);
- (b) determining a first neighborhood of the selected value from said matrix ($N_s \leftarrow \text{BuildNeighborhood}(G_s, L, X_s, Y_s)$, page 483, **function** C, line 1); and
- (c) comparing said first neighborhood to neighborhoods of said sample texture to determine an optimal value of said sample texture (**function** C, line 5-6, page 483).

15. As per claim 10, Wei demonstrated all the elements as applied to the rejection of dependent claim 9, supra, and further discloses the step of:

- (d) repeating steps (a)-(c) for each value of said matrix (**function** *Is*, line 5, page 483).

16. As per claim 14, Wei demonstrated all the elements as applied to the rejection of independent claim 1, supra, and further discloses said providing step

Art Unit: 2672

comprises providing pixel values to said matrix ($G_s \leftarrow \text{BuildPyramid}(I_s)$ where I_s are a plurality of constants).

17. As per claim 17, Wei discloses a system for generating a synthesized texture from a sample texture, said system comprising:

a first data structure defining said sample texture of a first plurality of values (G_s where G_s is a Gaussian matrix, page 483 Section 2.6; G_s is built from I_s which are a plurality of texture samples with a size, page 481 Section 2);

a second data structure defining a texture of a second plurality of values, wherein at least a portion of said values of said second data structure are random (G_s is a Gaussian matrix, therefore the elements are random values) and wherein at least a portion of said values of said second data structure represent a desired structure according to which graphical features are to substantially conform (I_s which are a plurality of texture samples with a size, page 481 Section 2); and

a texture synthesis algorithm, said texture synthesis algorithm being operable to utilize at least said first data structure and said second data structure to generate a synthesized texture having graphical features arranged therein in substantial conformance to said desired structure (**function** I_s is a texture synthesis process, where G_s is the desired size, page 483 section 2.6).

18. As per claim 18, Wei demonstrated all the elements as applied to the rejection of independent claim 17, supra, and further discloses said first data structure is of a first size and wherein said second data structure is of a second size (I_s is a first size and G_s is the second size, page 483 section 2.6).

Art Unit: 2672

19. As per claim 19, Wei demonstrated all the elements as applied to the rejection of independent claim 17, supra, and further discloses at least a portion of said values of said second data structure comprises:

constant values arranged in said second data structure to represent said desired structure ($G_s \leftarrow \text{BuildPyramid}(I_s)$ where I_s are a plurality of constants).

20. As per claim 20, Wei demonstrated all the elements as applied to the rejection of independent claim 17, supra, and further discloses said second data structure is populated with values from a pre-existing file comprising said at least a portion of said values that identify said desired structure (I_a is the pre-existing texture sample from a file that identify said desired structure).

21. As per claim 23, Wei demonstrated all the elements as applied to the rejection of independent claim 17, supra, and further discloses said texture synthesis algorithm is operable to transform said second data structure into said synthesized texture ($G_s \leftarrow \text{BuildPyramid}(I_s)$ is a transforming process).

22. As per claim 25, Wei demonstrated all the elements as applied to the rejection of independent claim 17, supra, and further discloses wherein said texture synthesis algorithm is further operable to

select a value from said second data structure (selecting (X_s, Y_s), page 483, **function** I_s , line 5),

determine a first neighborhood of the selected value from said second data structure ($N_s \leftarrow \text{BuildNeighborhood}(G_s, L, X_s, Y_s)$, page 483, **function** C, line 1),

compare said first neighborhood to neighborhoods of said first data structure to determine an optimal value of said first data structure, and assign said optimal value to the selected value of said second data structure (**function C**, line 5-7, page 483).

23. As per claim 27, Wei discloses a system for synthesizing a texture of a desired size from a sample texture, said system comprising:

code for generating a matrix of said desired size (G_s where G_s is a Gaussian matrix, page 483 Section 2.6; G_s is built from I_s which are a plurality of texture samples with a size, page 481 Section 2);

code for initializing said matrix with a plurality of values, wherein at least a portion of said values are random (G_s is a Gaussian matrix, therefore the elements are random values) and wherein at least a portion of said values represent a desired structure according to which graphical features are to be arranged (I_s which are a plurality of texture samples with a size, page 481 Section 2); and

code for generating a synthesized texture of said desired size having graphical features arranged therein according to said desired structure (**function I_s** is a texture synthesis process, where G_s is the desired size, page 483 section 2.6).

24. As per claim 28, Wei demonstrated all the elements as applied to the rejection of independent claim 27, *supra*, and further discloses initializing said matrix further comprises:

Art Unit: 2672

code for providing constant values to said matrix arranged therein to identify said desired structure ($G_s \leftarrow \text{BuildPyramid}(I_s)$ where I_s are a plurality of constants).

25. As per claim 29, Wei demonstrated all the elements as applied to the rejection of independent claim 27, supra, and further discloses initializing said matrix further comprises:

code for populating said matrix with values from a pre-existing file (I_a is the pre-existing texture sample from a file).

26. As per claim 30, Wei demonstrated all the elements as applied to the rejection of independent claim 27, supra, and further discloses generating comprises:

code for transforming at least a portion of said values of said matrix such that said matrix defines said synthesized texture ($G_s \leftarrow \text{BuildPyramid}(I_s)$ is a transforming process).

27. As per claim 31, Wei demonstrated all the elements as applied to the rejection of independent claim 27, supra, and further discloses generating further comprises:

code for determining a first neighborhood of a selected value from said matrix (selecting (X_s, Y_s) , page 483, **function** I_s , line 5);

code for comparing said first neighborhood to neighborhoods of said sample texture to determine an optimal value of said sample texture ($N_s \leftarrow \text{BuildNeighborhood}(G_s, L, X_s, Y_s)$, page 483, **function** C, line 1); and

Art Unit: 2672

code for assigning said optimal value of said sample texture to the selected value of said matrix (**function C**, line 5-7, page 483).

Claim Rejections - 35 USC § 103

28. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

29. Claims 11-12 and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wei et al. (SIGGRAPH 2000 Conference Proceedings pg. 479-488).

30. As per claim 11, Wei demonstrated all the elements as applied to the rejection of independent claim 1, supra.

As for said sample texture comprises a parametric texture map (PTM) texture, since PTM is a notoriously well known class of texture map, it would have been obvious to one of ordinary skill in the art at the time the invention was made to extend the method to parametric texture map in order to synthesize parametric texture.

31. As per claim 12, Wei demonstrated all the elements as applied to the rejection of dependent claim 11, supra, and further discloses providing texture values to said matrix ($G_s \leftarrow \text{BuildPyramid}(I_s)$ where I_s are a plurality of constants).

Art Unit: 2672

32. As per claim 21, Wei demonstrated all the elements as applied to the rejection of independent claim 17, supra.

As for said sample texture comprises a parametric texture map (PTM) texture, since PTM is a notoriously well known class of texture map, it would have been obvious to one of ordinary skill in the art at the time the invention was made to extend the method to parametric texture map in order to synthesize parametric texture.

33. As per claim 22, Wei demonstrated all the elements as applied to the rejection of dependent claim 21, supra, and further discloses said first plurality of values comprise texel values.

34. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wei et al. as applied to claim 1 above, and further in view of Gossett.

35. As per claim 13, Wei demonstrated all the elements as applied to the rejection of independent claim 1, supra.

Wei discloses a method of synthesize an image. It is noted that Wei does not explicitly disclose sample texture comprises a texture of a format selected from the group consisting of red-green-blue (RGB), red-green-blue-alpha (RGBA), color index, luminance, and luminance alpha, however, this is known in the art as taught by Gossett. Gossett discloses a method of texture synthesis using red-green-blue (RGB), red-green-blue-alpha (RGBA), luminance, and luminance alpha (column 5, Table 1).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Gossett into Wei

Art Unit: 2672

because Gossett discloses a method of synthesizing image and Gossett the texture format can be in said format in order to accurately describe texture.

36. Claims 15, 16, 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wei et al. as applied to claim 1 above, and further in view of Kent (4,601,055).

37. As per claim 15, Wei demonstrated all the elements as applied to the rejection of independent claim 1, supra.

Wei discloses a method of synthesize an image. It is noted that Wei does not explicitly disclose the step of re-sizing said synthesized texture, however, this is known in the art as taught by Kent. Kent discloses a method of synthesizing image in which the synthesized image is can be re-sized ("For objects of large area, all that would need to be done would be to continue constructing pyramid levels until the desired pixel size was reached, column 19, line 61-63).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Kent into Wei because Wei discloses a method of synthesizing image and Kent discloses the synthesized image can be re-sized in order to achieve maximum contrast with the background.

38. As per claim 16, Wei demonstrated all the elements as applied to the rejection of independent claim 1, supra.

Wei discloses a method of synthesize an image. It is noted that Wei does not explicitly disclose said desired size is not a power of 2, further comprising the step of re-sizing said synthesized texture to a size that is a power of 2, however,

Art Unit: 2672

this is known in the art as taught by Kent. Kent discloses a method of synthesizing image in which the synthesized image is can be re-sized in a power of 2 ("The method is to construct a pyramid of images l_0, l_1, \dots, l_k . Here k is the level at which single pixels correspond to regions in the original image of about the right sizes (i.e., within the nearest power of two), column 19, line 64-67).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Kent into Wei because Wei discloses a method of synthesizing image and Kent discloses the synthesized image can be re-sized in order to achieve maximum contrast with the background.

39. As per claim 24, Wei demonstrated all the elements as applied to the rejection of dependent claim 23, supra.

Wei discloses a method of synthesize an image. It is noted that Wei does not explicitly disclose said second data structure has a size that is not a power of 2, and wherein said texture synthesis algorithm is further operable to re-size said synthesized texture to a size that is a power of 2, however, this is known in the art as taught by Kent. Kent discloses a method of synthesizing image in which the synthesized image is can be re-sized in a power of 2 ("The method is to construct a pyramid of images l_0, l_1, \dots, l_k . Here k is the level at which single pixels correspond to regions in the original image of about the right sizes (i.e., within the nearest power of two), column 19, line 64-67).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Kent into Wei

Art Unit: 2672

because Wei discloses a method of synthesizing image and Kent discloses the synthesized image can be re-sized in order to achieve maximum contrast with the background.

40. As per claim 26, Wei demonstrated all the elements as applied to the rejection of independent claim 17, *supra*.

Wei discloses a method of synthesize an image. It is noted that Wei does not explicitly disclose the step of re-sizing said synthesized texture, however, this is known in the art as taught by Kent. Kent discloses a method of synthesizing image in which the synthesized image is can be re-sized ("For objects of large area, all that would need to be done would be to continue constructing pyramid levels until the desired pixel size was reached, column 19, line 61-63).

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Kent into Wei because Wei discloses a method of synthesizing image and Kent discloses the synthesized image can be re-sized in order to achieve maximum contrast with the background.

Conclusion

41. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Inquiries

42. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Ryan Yang** whose telephone number is **(703) 308-6133**.

Art Unit: 2672

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Michael Razavi**, can be reached at **(703) 305-4713**.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121

Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.



Ryan Yang

September 21, 2003